

9<sup>th</sup> April 2021

The Owners

148 Gaudrons Road

Sapphire Beach NSW 2450

*C/O Mr Stephen Sawtell*

*Factor X Solutions Pty Ltd*

## **Stormwater Assessment to Support Planning Proposal**

**148 Gaudrons Road Sapphire Beach, Lot 7 DP555490**

### **Background**

Lot 7 DP555490 is proposed to be rezoned to facilitate future subdivision to minimum 1 hectare lots. A pre-lodgement meeting was held with Coffs Harbour City Council on 17 June 2020 and comments were raised in regards to Flooding and Overland Flow. The objective of this assessment is to undertake a preliminary Hydrological and Hydraulic analysis to assess the potential restriction imposed on the future lots by the natural drainage gully that traverses the site.

### **Site Description**

The site is located on the Northern side of Gaudrons road. The approximate site area is 2.05 hectares and is traversed by a natural drainage gully running in a North-East direction. The natural drainage gully continues through the adjoining property (Lot 218 DP812014) for approximately 180m before joining another natural watercourse. The drainage line is steeply graded and falls approximately 60m in level over 310m of length. Side slopes are in the order of 30% to 35%. The subject site and downstream lot are shown in figure 1.

### **Methodology**

To determine the potential restriction imposed on future subdivision of lot 7 DP 555490 a preliminary desktop Hydrological and Hydraulic analysis has been undertaken. Catchment definition has been based on aerial imagery, and topographic mapping. Hydrological analysis has been undertaken in accordance with the Australian Rainfall Runoff (ARR) 2019 procedure for peak flow estimation. The 100yr ARI (1% AEP) event has been adopted for analysis. Hydraulic analysis has been undertaken using Mannings equation to estimate the natural drainage line capacity at a depth of flow of 0.3m.



Figure 1 – Subject site and adjoining lots (source Six Maps)

## Catchment Definition

The catchment is primarily small lot Rural Residential landuse, and extends to Gaudrons Road to the South, and is confined by a ridge to the west on adjoining Lots. The catchment area was estimated using topographic maps, resulting in a measured approximate catchment area of 2 hectares. The catchment is shown below in figure 2.



Figure 2 – Estimated Catchment Area (source Six Maps)

## Hydrological Analysis

ARR2019 specifies that an ensemble of 10 patterns are to be calculated for every duration, with the design peak flow taken as the average of the 10 patterns. ARR2019 data was accessed from the associated Datahub website including ARR2019 Storms, Rainfall Ensembles, and Preburst Rainfall. DRAINS software was used to simulate the catchment with an Initial Loss (IL) Continuing Loss (CL) Model. A summary of the adopted modelling parameters is provided below:

- ARR Data Hub Latitude, -30.226231 Longitude, 153.132447
- Impervious Areas IL 0.4mm, CL 0mm (ARR2019 Table 9.6.8)
- Pervious Areas IL 50mm, CL 3.3mm (Review of ARR Design Inputs for NSW Final Report (OEH), Site 205007 Woolgoolga)
- Catchment Area 2 hectares
- Indirectly connected impervious area 0.12 hectares (6%), 2min flow time
- Pervious Area 94%, 11 min flow time (Friends equation - 110m flow length,  $n = 0.035$ , Slope 35%)

The peak mean flow of 1.369m<sup>3</sup>/s for the 1% AEP event at the catchment outlet occurs during the 15 minute storm burst. Results for the full ensemble of storms modelled is included in Figure 3.

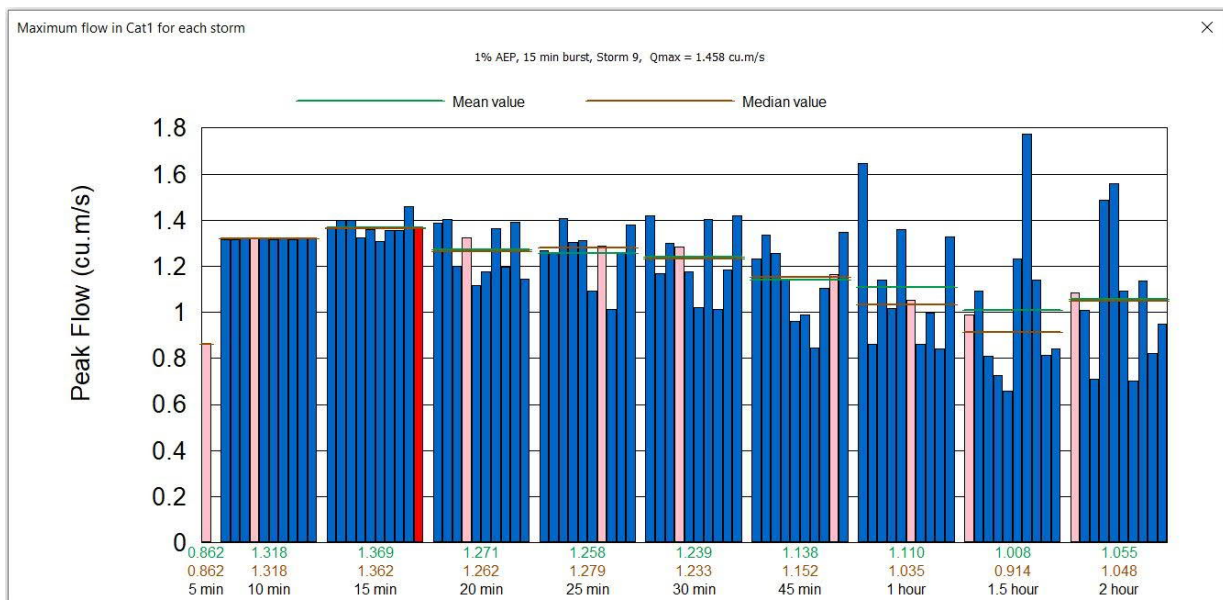


Figure 3 – DRAINS results

## Preliminary Hydraulic Analysis

A check of the potential depth of flow in the gully was approximated using Mannings equation with the following assumptions;

- Grade 15%
- Mannings n Roughness Coefficient 0.043
- Base Width 2m
- Side Slope 1 in 3 metres
- Normal Depth 0.3m

The capacity of the estimated drainage gully cross section at 0.3m is 1.548m<sup>3</sup>/s. Due to the steepness of the site and the drainage channel any floodplain storage or tailwater effects are likely to be minimal.

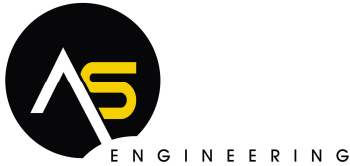
## Potential Site Restrictions

The site was inspected on 9th April 2021. A photo looking up the existing gully from the eastern side of the property is included in figure 3 below. The channel is well defined and widens as the gully flattens out towards the eastern boundary of the site. Any restrictions on future development due to flooding potential would be limited to the defined channel and banks.



*Figure 3 – Existing Gully (looking South-West from Eastern boundary)*





## Conclusion

The natural drainage line that traverses the site does not significantly constrain the site for the proposed density of minimum 1 hectare lots.

The steep nature of the site and its location at the top of the catchment will generally result in any overland flows generated on the site being quickly conveyed to the existing natural drainage line, to discharge from the site.

Future development on the site should:

- take into consideration the location of the existing drainage gully
- site any structures clear of the defined channel and banks
- be designed to limit the consequences for downstream properties.

To address overland sheet flows, adoption of general building controls requiring a minimum difference between finished floor levels and finished ground levels, and adequate site drainage would provide sufficient protection to cope with shallow water depths.

For any further information please do not hesitate to contact AS Engineering directly.

Yours faithfully

**AS Engineering**

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